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Clinicians' and patients' assessment of activity overuse and underuse and its relation to physical capacity

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To explore clinicians' and patients' (self)-assessment of activity overuse and underuse, and its relationship with physical capacity in patients with chronic musculoskeletal pain (CMP). Study design was cross-sectional. Participants included patients with CMP, admitted to a multidisciplinary outpatient pain rehabilitation program. The main measures used were as follows: a five-point scale to rate overuse and underuse, filled out by clinicians and patients; a five-point scale to rate physical capacity, filled out by clinicians and patients; and lifting and aerobic capacity. Cohen's κ were calculated to test the agreement between assessments. Depending on the normality, a *t*-test or a Mann–Whitney *U*-test was used to test differences between the results of a capacity test and patients' and clinicians' assessments of capacity. A total of 141 patients were included: 42% were men, and 60% had back pain, 21% had neck pain, 19% had pain in a different location. Six percent of the patients rated themselves as underusers; clinicians rated 23% of the patients as underusers. Clinicians and patients fairly agreed (61%; $\kappa = 0.23$) in their assessments of overuse and underuse. Differences in the physical capacity of overuse and underusers, as assessed by clinicians and patients, were all nonsignificant ($P > 0.05$). The physical capacity of overusers did not differ from that of underusers ($P < 0.05$). In conclusion, although clinicians and patients with CMP fairly agree on their assessment of activity overuse and underuse, the physical capacity of overusers was not different from that of underusers.

Ziel der Studie war die Untersuchung der (Selbst-) Evaluierung der körperlichen Über- und Unterbelastung seitens der Ärzte und Patienten sowie ihre Beziehung zur körperlichen Belastbarkeit von Patienten mit chronischen Muskel- und Gelenkschmerzen (CMP). Es handelte sich um eine Querschnittsstudie. Die Teilnehmer waren u. a. Patienten mit CMP, die an einem multidisziplinären ambulanten Programm zur Schmerz-Rehabilitation teilnahmen. Die wichtigsten verwendeten Messgrößen waren eine 5-Punkte-Skala zur Evaluierung von Über- und Unterbelastung (ausgefüllt von Ärzten und Patienten), eine 5-Punkte-Skala zur Evaluierung der körperlichen Belastbarkeit (ausgefüllt von Ärzten und Patienten) sowie eine Skala zur Evaluierung der Tragfähigkeit und aeroben Kapazität. Cohens κ wurde zur Kontrolle der Übereinstimmung der Beurteilungen berechnet. Je nach Normalität wurde ein *t*-Test oder ein Mann-Whitney-*U*-Test zur Kontrolle der Testdifferenzen zwischen den Ergebnissen eines Belastbarkeitstests und den Belastbarkeitsbeurteilungen seitens der Patienten und Ärzte angewandt. An der Studie nahmen insgesamt 141 Patienten teil; 42% waren Männer, 60% hatten Rückenschmerzen, 21% Nackenschmerzen und 19% Schmerzen an anderen Stellen. Sechs Prozent der Patienten stuften sich selbst als unterbelastet ein, die Ärzte dagegen stuften 23% der Patienten als unterbelastet ein. Ärzte und Patienten stimmten weitesgehend (61%; $\kappa = 0.23$) bei ihrer Beurteilung von Über- und Unterbelastung überein. Die Differenzen bei der körperlichen Belastbarkeit von über- und unterbelasteten Patienten, die von Ärzten und Patienten beurteilt wurden, waren alle nicht-signifikant ($P > 0.05$). Die körperliche Belastbarkeit von überbelasteten Patienten unterschied sich nicht von der der unterbelasteten Patienten ($P < 0.05$). Zusammenfassend lässt sich sagen, dass die körperliche Belastbarkeit von überbelasteten Patienten sich nicht von der der unterbelasteten Patienten unterschied, obwohl Ärzte und Patienten mit CMP weitesgehend in ihrer Beurteilung der körperlichen Über- und Unterbelastung übereinstimmen.

El objetivo de este estudio fue investigar la (auto)evaluación por parte de médicos y pacientes del exceso y la falta de uso de la actividad, así como su relación con la capacidad física en pacientes con dolor musculoesquelético crónico (DMC). El diseño del estudio fue transversal. Entre los participantes se encontraban pacientes con DMC, previamente admitidos en un programa multidisciplinar de rehabilitación de pacientes externos. Las principales mediciones que se llevaron a cabo fueron: una escala de cinco puntos para evaluar el exceso y la falta de uso, cumplimentada por los médicos y los pacientes; una escala de cinco puntos para evaluar la capacidad física, cumplimentada por los médicos y los pacientes; y la capacidad aeróbica y de levantamiento. Se calculó la κ de Cohen para evaluar la similitud entre las mediciones. Dependiendo de la normalidad, se llevó a cabo un *t*-test o un test *U* de Mann–Whitney con el fin de analizar las diferencias entre los resultados de una prueba de capacidad y la evaluación de la capacidad por parte de los pacientes y los médicos. Se incluyó un total de 141 pacientes; el 42% eran hombres y el 60% presentaban dolor de espalda, el 21% dolor de cuello y el 19% sufría dolores en otra parte. El seis por ciento de los pacientes autoevaluó su uso como escaso, mientras que los médicos evaluaron el uso del 23% de los pacientes como escaso. Los médicos y los pacientes se mantuvieron de acuerdo

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(61%; $\kappa = 0.23$) en cuanto a sus evaluaciones de exceso y falta de uso. Las diferencias en la capacidad física de los participantes con exceso y falta de uso, de acuerdo con la evaluación de los médicos y los pacientes, fueron no significativas ($P > 0.05$). La capacidad física de los participantes con exceso de uso no difirió de la de aquéllos con falta de uso ($P < 0.05$). En conclusión, a pesar de que los médicos y los pacientes con DMC mostraron su acuerdo sobre la evaluación del exceso y la falta de uso de la actividad, la capacidad física de los participantes con exceso de uso no fue distinta de la de los participantes con falta de uso.

Cette étude avait pour objet d'explorer l'(auto)-évaluation de la sur- utilisation et de la sous-utilisation des activités par les cliniciens et les patients, et sa relation avec les capacités physiques chez les patients souffrant de douleur chronique musculo-squelettique (DCMS). Elle était de conception transversale. Les participants comprenaient des patients atteints de DCMS admis à un programme de rééducation ambulatoire multidisciplinaire de la douleur. Les principales mesures utilisées étaient les suivantes : une échelle en cinq points pour classer la sur-utilisation et la sous-utilisation, remplie par les cliniciens et les patients ; une échelle en cinq points pour classer la capacité physique, remplie par les cliniciens et les patients ; et de la capacité aérobie et de levage. Les κ de Cohen ont été calculés pour vérifier l'accord entre les évaluations. Selon la normalité, un test *t* ou un test *U* de Mann-Whitney a été utilisé pour tester les différences entre les résultats d'un test des capacités et des évaluations de la capacité par les patients et les cliniciens. Un total de 141 patients ont été recrutés, dont 42% étaient des hommes, et dont 60% présentaient des douleurs dorsales, 21% des douleurs au cou et 19% des douleurs à un endroit différent. Six pour cent des patients se déclaraient sous-utilisateurs, les cliniciens en classaient 23% comme sous-utilisateurs. Les cliniciens et les patients étaient plutôt en accord (61%; $\kappa = 0.23$) dans leurs évaluations de la sur-utilisation et la sous-utilisation. Les différences dans la capacité physique des sur- et des sous-utilisateurs, évaluées par les cliniciens et les patients, étaient toutes insignifiantes ($P > 0.05$). La capacité physique des sur-utilisateurs ne différait pas de celle des sous-utilisateurs ($P < 0.05$). En conclusion, bien que les cliniciens et les patients atteints de DCMS soient plutôt d'accord sur leur évaluation de la sur-utilisation et la sous-utilisation des activités, la capacité physique des sur-utilisateurs n'était pas différente de celle des sous-utilisateurs. ***International Journal of Rehabilitation Research*** **35:124–129 © 2012 Wolters Kluwer Health | Lippincott Williams & Wilkins.**

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Introduction

In rehabilitation of patients with chronic musculoskeletal pain (CMP), a distinction between two subgroups of patients is often made by clinicians: activity underusers and activity overusers. This implies that, compared with an intrapersonal norm, the level of activities of underusers is too low and the activity level of overusers is too high. This appears to be related to activity avoidance and activity persistence behavior patterns (Hasenbring and Verbunt, 2010).

The theory underlying underuse is described in the fear-avoidance model, where pain-related fear eventually leads to activity avoidance (Hasenbring and Verbunt, 2010). The theory underlying activity overuse is described in the avoidance-endurance model (Hasenbring, 2000), where some of the patients respond to pain with persistence of activities despite pain (Hasenbring and Verbunt, 2010). Treatments of activity underusers usually include elements of exposure to avoided situations or activities. Treatments of activity overusers usually comprise physical and mental rest and actually experiencing the pain instead of running away from it (Koulil *et al.*, 2008).

Despite its widespread clinical use, no definition of activity underuse and overuse is available and there is no valid and reliable means to assess it. Therefore, in the daily practice of pain rehabilitation in the Netherlands, patients with CMP are classified by clinicians without any classification criteria. No studies have been identified exploring clinicians' assessment of activity overuse and underuse. It is assumed that clinicians base their classification partly on the theoretical framework of overuse and underuse. A relationship with physical capacity (what can a patient do) is expected, but evidence to support this relation is inconsistent (Vlaeyen and Linton, 2000; Hasenbring *et al.*, 2006; Leeuw *et al.*, 2007; McCracken and Samuel, 2007; Reneman *et al.*, 2007; Schiphorst Preuper *et al.*, 2008; Hasenbring and Verbunt, 2010; Helmus *et al.*, 2012; Huijnen *et al.*, 2011).

It is also unknown whether the assessment of clinicians concurs with the self-assessment of patients. Patients' self-assessments of physical activities were only weakly associated with objective movement registration (Verbunt *et al.*, 2001; Van der Ploeg *et al.*, 2007) and overuse and underestimations are often made (Van Weering *et al.*, 2010).

Considering the above-mentioned studies, it is likely that self-reported activity levels may differ from clinician-assessed activity levels. Presumably, for patients, physical capacity levels should be easier to assess than activity overuse and underuse.

The current study focused on the clinicians' and patients' (self)-assessment of activity overuse and underuse, clinicians' and patients (self)-assessment of physical capacity, and its relationship with physical capacity. Study question 1: do clinicians and patients agree on their assessment of activity overuse and underuse? It was hypothesized that the agreement between clinician and patient assessment is low. Study question 2: is the physical capacity of activity overusers higher than that of activity underusers? It was hypothesized that overusers have a higher physical capacity than the patients who were considered underusers. Study question 3: is the physical capacity of patients who estimate to do well on the tests higher than the capacity of patients who estimate to do poorly? It was hypothesized that the physical performance of patients with higher self-efficacy would be higher.

Methods

Study design and procedures

A cross-sectional, multivariate, and explorative study was carried out. As part of care as usual, patients filled out questionnaires. Data were obtained from the results of the questionnaires, filled out in the period from 2006 to 2008. Patients were included for treatment by a physiatrist of the pain rehabilitation team. All measures were performed before start of the pain rehabilitation program. The physical therapist interviewed the patients (brief personal history) and tested their physical capacity by a lifting and an aerobic capacity test. Before the test, patients were asked to rate themselves on a scale aimed at classification of overusers or underusers, and to judge their performances on the capacity tests. Both scales were introduced by the physical therapist and were not standardized. Before the testing, on the basis of history, the clinician also rated the patient on the same scale aimed at classification of overuse or underuse.

Study sample

One hundred and forty-one patients with CMP, admitted to a multidisciplinary university-based outpatient pain rehabilitation program in the north of the Netherlands, were included for the study. The inclusion criteria were as follows: nonspecific CMP (duration > 3 months), age between 18 and 65 years, and sufficient knowledge of the Dutch language (to complete questionnaires). The exclusion criteria were as follows: comorbidity (e.g. cardiovascular or pulmonary diseases) reducing physical capacity, addiction to drugs, and extensive psychological or behavioral problems. Patients signed informed consent for the use of their data (anonymously) for research purposes.

Measures

A single five-point scale was constructed to rate activity overuse and underuse: strong underuser (1); underuser (2); neutral (3); overuser (4); and strong overuser (5). Patients and clinicians used the same scale. Clinicians were not blinded to the patients' rating. Patients were also asked to rate their estimated performance on the lifting and aerobic test on a five-point scale. The following question was posed: 'How do you estimate your performance on the coming lifting and aerobe test as compared to healthy people of your sex and age? The answers were very poor (1); poor (2); neutral (3); good (4); and very good (5).

Lifting capacity was assessed by the progressive isoinertial lifting evaluation, in which patients performed four lifts from the table to the floor and vice versa within 20 s. Weight increments of 4.5 kg for men and 2.25 kg for women were used until a criterion for maximum performance was attained. The measured outcome was the number of kilograms lifted (Hodselmans *et al.*, 2008).

A ml/kg lean body mass-based Åstrand bicycle test was used to assess the maximum oxygen consumption. Once heart rate (HR) exceeded 120 beats/min, the patient cycled 6 min under a fixed workload to reach a steady-state phase, meaning that the HR did not vary more than ±5 beats/min during the final 2 min of exercise. The mean HR during the final 2 min of exercise was calculated. The maximum oxygen uptake ($VO_{2\ max}$) was estimated using the Binkhorst calculation and was corrected for age using an age correction factor (Hodselmans *et al.*, 2008).

For descriptive purposes, pain intensity was measured using a 100 mm visual analogue scale, where 0 indicates no pain and 100 indicates extreme pain. Self-reported disability in patients with chronic back pain was measured with the Roland Morris Disability Questionnaire (RMDQ). The RMDQ scores range from 0 to 24, where higher scores indicate more disability.

Statistical analyses

For the descriptive subject characteristics and the assessment of percentages, the frequencies of the total group and of men and women were calculated. Cohen's κ were calculated to test the agreement between the clinicians' and the patients' assessments of over/underuse. κ less than 0.20 indicates a poor; κ between 0.21 and 0.40 indicates a fair; κ between 0.41 and 0.60 indicates a moderate; κ between 0.61 and 0.80 indicates a good; and κ between 0.81 and 1.0 indicates a very good agreement (Altman, 1991). The distribution of the data was checked for normality (Kolmogorov–Smirnov test). Depending on the normality, a *t*-test for normally distributed data or a Mann–Whitney *U*-test for non-normally distributed data was used to test differences between the capacity test results and the patients' and clinicians' assessment of

capacity for men and women separately. The results were considered significant when P value is less than 0.05. A Bonferroni's correction was applied to reduce type I error in interpreting the results of multiple analyses: $\alpha = 0.008$ (0.05 divided by 6). For the interpretation of the results, the categories strong underuse (1) and underuse (2) were combined to underuse. The categories overuse (4) and strong overuse (5) were combined to overuse.

Results

A total of 59 male and 82 female patients were included, of whom 60% had back pain, 21% had neck pain, and 19% had pain in a different location. The mean score on the RMDQ was 9 (SD = 4.4, $n = 47$). The mean current pain intensity was 55 (SD = 26.4), the mean worst pain intensity last week was 77 (SD = 20.4), and the mean best pain intensity last week was 33 (SD = 26.5) ($n = 47$). The results of the assessments of patients and clinicians are presented in Table 1. Most patients (69%) rated themselves as activity overusers, whereas very few rated themselves as activity underusers (6%). The clinicians also rated most patients as overusers (63%), but compared with the patients, they rated a higher percentage of patients as underusers (23%).

Agreement between the clinician and the patient assessments is presented in Table 2. Clinicians and patients agreed in 61% of the cases. The κ value of this agreement was $\kappa = 0.23$ ($P < 0.001$), indicating a fair agreement (Altman, 1991) (research question 1).

In Table 3, the physical capacities of the patients are presented. For men, lifting capacity was not normally distributed ($P = 0.007$) and aerobic capacity was normally distributed ($P = 0.146$). For women, lifting capacity was normally distributed ($P = 0.054$) and aerobic capacity was not normally distributed ($P = 0.009$). Lifting capacity in women differed significantly ($P < 0.008$, after Bonferroni's correction) between activity overusers and activity underusers as assessed by clinicians. The other analyses revealed no significant differences. Two comparisons were not carried out because the number of patients was too small ($n \leq 5$). Three comparisons should be considered as trends ($5 < n < 10$) (research question 2).

Patient assessments of their performance on the capacity tests are presented in Table 4. No significant differences were found in the capacity on the lifting and aerobic test of patients (both men and women) who assessed themselves as (very) good or (very) poor on that test (research question 3).

Table 1 Assessment of activity underuse and overuse by clinicians and patients ($n = 141$)

	n (%)		
	Underuser	Neutral	Overuser
Patient assessment	8 (6)	35 (25)	98 (69)
Clinician assessment	32 (23)	20 (14)	89 (63)

Table 2 Agreement of assessments between patients and clinicians ($n = 141$)

	Clinician assessment, *n* (%)			
Patient assessment	Underuser	Neutral	Overuser	Total
Underuse	4 (3)	2 (1)	2 (1)	8 (6)
Neutral	5 (4)	12 (9)	18 (13)	35 (25)
Overuse	23 (16)	6 (4)	69 (49)	98 (70)
Total	32 (23)	20 (14)	89 (63)	141 (100)

Table 3 Physical capacity of activity overuse and underusers, as assessed by patients and clinicians ($n = 141$)

	Mean (SD)			
	Lifting capacity (*n*)		Aerobic capacity (ml/kgO_2)	
	Males	Females	Males	Females
Patient assessment				
Underuse	NA	114.6 (55.3)[a]	NA	2.0 (0.5)[a]
Overuse	292.3 (103.0)	151.8 (58.5)	2.8 (0.8)	2.3 (0.6)
P	NA	0.18	NA	0.42
Clinician assessment				
Underuse	253.5 (96.7)	125.2 (49.5)	2.7 (0.6)[a]	2.2 (0.4)
Overuse	304.6 (95.4)	169.8 (58.7)	2.9 (0.9)	2.2 (0.7)
P	0.16	0.01*	0.74	0.82

NA: not applicable because $n \leq 5$.
*Significant when *P* value is less than 0.008 (Bonferroni's correction).
[a]Trend $5 < n < 10$.

Table 4 Patient estimation of physical capacity and observed capacity ($n = 141$)

	Mean (SD)			
	Lifting capacity (*n*)		Aerobic capacity (ml/kg)	
	Males	Females	Males	Females
Patient: (very) poor	279 (110)	149 (54)	2.7 (0.8)	2.1 (0.5)
Patient: (very) good	338 (106)	200 (52)	3.3 (1.0)	2.8 (0.9)
P	0.09	0.11	0.12	0.12

Discussion

This study was performed to explore the relationship of clinicians' and patients' (self)-assessment of activity overuse and underuse and physical capacity and the relationship of patients' assessment of their performance on two capacity tests and their tests results. Another aim of this study was the agreement between clinicians' and patients' assessment on activity overuse and underuse. The results indicate that clinicians and patients fairly agree (61%; $\kappa = 0.23$) in their assessments of activity overuse and underuse, although there may have been some unintentional influences due to the clinical setting of the study. Because clinicians were not blinded to the patients' rating, the clinicians' assessment may have therefore been partly based on the self-assessment of the patients, which could have contributed to the fair agreement. Furthermore, the introduction of the scale

by the clinicians was not standardized and therefore this may have also contributed to the fair agreement. Both clinicians and patients assessed activity overuse more often than activity underuse. The physical capacity of activity underusers was not different from that of activity overusers, as assessed by patients. It was only marginally different, as assessed by clinicians. Patient self-assessment of physical capacity was largely different from observed capacity. Also, the patients' assessment of their test performance was not different for those who assessed themselves as good or as poor. It is important to gain an insight into clinicians' and patients' (self)-assessment of activity overuse and underuse because a pain management program is often tailored to the individual patients' profile, which is partly based on the construct of activity overuse and underuse. However, because of the absence of a definition and a valid and reliable instrument to assess overuse and underuse, the current assessment performed by clinicians and patients is based on implicit criteria. Despite the widespread use of activity overuse and underuse among clinicians in pain rehabilitation, current assessment and criteria have not been investigated. Furthermore, for optimal treatment results, it is important that clinicians and patients agree in their assessment of activity overuse and underuse. Negotiation of the goals and content of rehabilitation is important to ensure patients' active collaboration and engagement, which makes a significant contribution toward positive treatment outcomes (Horvath, 2001).

The results of this study are not in agreement with current theories of activity overuse and underuse. It was hypothesized that avoidance of activities (by the underusers) would result in hypervigilance to bodily sensations, followed by disability and disuse. In this group, a lower physical capacity was expected. It was also hypothesized that endurance of activities despite pain (by the overusers) and simultaneously ignoring physical sensations would result in a high level of activities and therefore in a high physical capacity. These a-priori expectations were not observed in this study. Although there are studies that report on the existence of a relationship between an avoiding or a confronting coping style and physical activities (Vlaeyen and Linton, 2000), the current study is more in agreement with studies in which this relationship seems to be nonexistent or weak (Hasenbring *et al.*, 2006; McCracken and Samuel, 2007; Schiphorst Preuper *et al.*, 2008; Huijnen *et al.*, 2011; Helmus *et al.*, 2012). The results of the current study strengthen the premise that the construct of activity overuse and underuse, according to clinicians and patients, is largely unrelated to physical capacity.

Although the mean RMDQ scores were slightly lower than those typically seen in rehabilitation practice, a major strength of the current study is that it strongly connects to the daily practice of pain rehabilitation in the Netherlands by exploring the clinicians' and patients' (self)-assessment of activity overuse and underuse. The results are therefore highly relevant to many clinicians. A limitation of the study is that the assessment scale was used in practice, but not tested psychometrically. Because the scale and its underlying constructs lacked definitions, clinicians may have used different (implicit) operational definitions. This may have contributed to the lack of agreement and to the absence of relations with objective measures. Another limitation was that the clinicians were not blinded to the patients' self-assessments, which may have led to an overestimation of the agreement between clinicians and patients. Furthermore, the scale was introduced by the clinician in a nonstandardized manner. The explanation by the clinician of the terms 'overuse' and 'underuse' could have led to a higher agreement between patient and clinician assessments. The agreement between clinicians and patients observed in this study exceeded our expectations on the basis of earlier findings (Brouwer *et al.*, 2005), and may be attributed to the clinical setting in which this study took place. In the daily practice of pain rehabilitation, it is important for clinicians, in order to create and ensure the therapeutic alliance, to be aware of the patients' assessment of their pain-coping behavior. If a similar study were to be conducted in a nonclinical (controlled, blinded) setting, the agreement may be lower. Furthermore, although trends point toward the absence of a relationship between activity overuse and underuse and physical capacity, more firm conclusions could not be drawn. In conclusion, despite its widespread use in pain rehabilitation, and although clinicians and patients with CMP fairly agree on their assessment of activity overuse and underuse, the results of this study show that their assessment is not related to physical capacity.

Currently, equivocal evidence is lacking to support any subgrouping system in patients with CMP (Kamper *et al.*, 2010). For further development and research, assuming that subgrouping is needed to individually tailored rehabilitation programs, we recommend that a theoretical base and a broader conception of coping strategies of patients to deal with CMP, which should not include only physical parameters, is developed. A general conception could be that activity underuse/overuse may vary across situations and time periods. Contextual factors, such as workload, emotional load, and carrying capacity, may influence a patient to avoid or persist in certain situations or in certain periods in time. In addition, patients' values and goals may be linked to a pattern of activity overuse or underuse specific to certain situations. Further development and research in this direction is needed.

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Conflicts of interest

There are no conflicts of interest.

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